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## CURRICULUM VITAE

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Present Address:

Clinical Laboratories, MC 812  
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### EDUCATION:

1. ---, B.S., Rensselaer Polytechnic Institute, Biology, ---
2. ---, Ph.D., University of Minnesota, Chemistry, ---. Thesis: "Manipulation of the fatty acid composition of mammalian plasma membranes in culture".

### POSTGRADUATE TRAINING

1. Clinical Chemistry Postdoctoral Fellow, Washington University School of Medicine, Barnes Hospital, ---
2. Technical Consultant Fellow, University of Minnesota ---

### ACADEMIC - PROFESSIONAL POSITIONS HELD

1. Medical Director of Clinical Laboratories, Hennepin County Medical Center, 1996 to present
2. Professor, University of Minnesota School of Medicine, Department of Laboratory Medicine and Pathology, July 1995 to present.
3. Medical Director of Clinical Chemistry and Toxicology Laboratories, Hennepin County Medical Center, July 1982 to present.
4. Medical Director Point of Care Testing, Hennepin County Medical Center, 1995 to present
5. Forensic Toxicology Consultant, Hennepin County Medical Examiner's Office, 1982 to present.
6. Professor, Department of Kinesiology, University of Minnesota, July 1995 to present.

7. Assistant Chairman, Department of Laboratory Medicine and Pathology, Hennepin County Medical Center, 1997 – present
8. Medical Director, HFA Clinical Laboratories, December 2001 to present.
9. Medical Director, North Central (formerly Regional Kidney Disease Program) Renal Laboratory of Total Renal Care (Davita), November 1992 to 2001.
10. Associate Director, Department of Pathology Residency Program 1993 to 2000.
11. University of Minnesota Graduate School Faculty Member:
  - a) Clinical Laboratory Science 1985 to present;
  - b) School of Kinesiology and Leisure Studies, 1992 to present;
  - c) Microbiology, Immunology, and Cancer Biology (Molecular Pathobiology) 1995 to present;
12. Associate Professor, Department of Kinesiology, University of Minnesota, 1992 - 1995.
13. Associate Professor U of Minnesota School of Medicine, Department of Laboratory Medicine and Pathology, July 1988 to June 1995.
14. Assistant Professor, University of Minnesota School of Medicine, Department of Laboratory Medicine and Pathology, July 1982 to June 1988.
15. Visiting Assistant Professor, Department of Chemistry, University of Wisconsin - River Falls, September to November 1979.

#### HONORS, AWARDS, FELLOWSHIPS

1. National Science Foundation Summer Fellowship in Chemistry, RPI, ---.
2. National Chemical Honorary Society, PHI Lambda Upsilon, ---.
3. NIH Research Training Grant, Washington University School of Medicine, --.
4. Young Investigator Award, International Society for Clinical Enzymology, ---.
5. Fellow, American College of Sports Medicine, FACSM, ---.
6. Visiting Professor, Karolinska Institute, Physiology III, Stockholm Sweden, November 1989; Recipient of Swedish National Council for Sports Research Award.
7. Visiting Lecturer, Danish Society Clinical Chemistry, Copenhagen Denmark, September 1991.
8. AACC Outstanding Speaker Award, 1995, 1996, 1997, 1998, 2001, 2002, 2003

9. 1997 Canadian Society of Clinical Chemists Traveling Lectureship

#### CERTIFICATIONS

1. Diplomate, American Board of Clinical Chemistry, Clinical Chemistry, ---.
2. Diplomate, American Board of Clinical Chemistry, Toxicological Chemistry, ---.
3. Board Eligible, American Board of Forensic Toxicology, ---.

#### PROFESSIONAL SOCIETIES - AFFILIATIONS

1. American Chemical Society, 1977.
2. American Association for Clinical Chemistry, 1980.
  - a. Associate Editor, Clinical Chemistry, 2001 to present
  - b. Board of Editors, Clinical Chemistry, 1991 - 2000; Editorials Editor, 1996 - 2000.
  - c. Section Co-Editor, Questions and Answers, Journal of the IFCC- present.
  - d. Board of Editors, Forensic Urine Drug Testing Newsletter, 1993-1995.
3. American College of Sports Medicine, 1981; Fellow 1986.
4. International Society of Clinical Enzymology, 1983.
5. American Academy of Forensic Sciences, 1986.
6. Academy of Clinical Laboratory Physicians and Scientists, 1991.
  - a. Executive Council Member-at-Large 1999-2002
  - b. President-elect 2002-2003
  - c. President 2003-2004
7. National Committee for Clinical Laboratory Standards (NCCLS); Clinical Chemistry, 1991-1993.
8. American Board of Clinical Chemistry, Board of Directors, 1992-1998.
9. Society of Forensic Toxicology (SOFT), 2000.
10. IFCC, Committee on Standardization of Markers of Cardiac Damage, 1998 – present; Chair 2004-
11. Editorial Board, Critical Reviews in Clinical Laboratory Sciences, 2000 – 2002.

12. FDA Clinical Chemistry and Clinical Toxicology Devices Panel of the Medical Devices Advisory Committee, Center for Devices and Radiological Health, Consultant.
13. Canadian Society of Clinical Chemists, 2000.
14. Member, United States Anti-Doping Agency Anti-Doping Review Board, 1/2003-1/2005

RESEARCH ([www.mmrf.org](http://www.mmrf.org) –research, Cardiac Biomarkers Trials Lab)

1. Clinical and Analytical Cardiac Biomarkers Trial Laboratory:  
Application of cardiac marker and ischemia assays for the detection of myocardial cell damage and ischemic injury, reperfusion following thrombolytic therapy, and risk stratification and outcomes research.
2. Myocardial and Skeletal Muscle Ischemia:  
Dynamics of protein (creatinine kinase isoenzymes, troponin subunits, xanthine oxidase/dehydrogenase, free radical scavengers) and mRNA profiles in human and animal heart and skeletal muscle following acute and chronic ischemia.
3. Sports Medicine – Biochemistry of Exercise:  
Dynamics of protein (creatinine kinase isoenzymes, troponin subunits, xanthine oxidase/dehydrogenase, free radical scavengers) and mRNA alterations in human and animal heart and skeletal muscle in response to exercise and muscle disuse.
4. Toxicology:  
Forensic /postmortem analysis of drugs and alcohol in tissues, blood, vitreous humor;  
medical legal ethanol pharmacokinetics; drugs of abuse testing.

#### RESEARCH REPORTS:

1. Potts KT, Dunlap WC, Apple FS. Photodimerization of some 1,2,4-triazolo (4,3-a) quinoline and 1,2,4-triazolo (3,4-a) -isoquinoline derivatives. *Tetrahedron* 1977; 33: 1263-7.
2. Ladenson JH, Apple FS, Koch DD. Misleading hyponatremia due to hyperlipemia: a method dependent error. *Ann Intern Med* 1981; 95: 707-8.
3. Apple FS, Koch DD, Graves S, Ladenson JH. Relationship between direct potentiometry and flame photometric measurement of sodium in blood. *Clin Chem* 1982; 28: 1931-5.
4. Apple FS, Greenspan N, Dietzler DN. Elevation of creatine kinase BB in hospitalized patients: importance of distinguishing BB CK from MB CK. *Ann Clin Lab Sci* 1982; 12: 398-402.
5. Ladenson JH, Apple FS, Aguanno JJ, Koch DD. Sodium measurements in multiple myeloma: two techniques compared. *Clin Chem* 1982; 28: 2383-6.

6. Apple FS, McGue MK. Serum changes during marathon training. *Am J Clin Path* 1983;79:716-9.
7. Apple FS, Walker FC, Dietzler DN. Serum creatinine concentrations and the discrepancy between EMIT and GLC phenytoin levels. *Ann Clin Lab Sci* 1983; 13: 385 - 92.
8. Ladenson JH, Apple FS, Aguanno JJ, Koch DD. Natriumbestimmung bei multiplem myelom; ein vergleich zweier techniken. *G T Lab Med* 1983; 6: 176 - 81 (In German).
9. Apple FS, Rogers MA, Sherman WM, Ivy JL. Creatine kinase isoenzyme patterns in gastrocnemius muscle obtained from marathon runners. *Selected Topics in Clinical Enzymol* 1984; 2: 419 - 28.
10. Apple FS, Rogers MA, Sherman WM, Ivy JL. Comparison of elevated serum creatine kinase MB activities post marathon race and post myocardial infarction. *Clin Chim Acta* 1984; 138: 111 - 8.
11. Apple FS, Rogers MA, Sherman WM, Costill D, Hagerman F, Ivy JL. Profile of creatine kinase isoenzymes in skeletal muscles of marathon runners. *Clin Chem* 1984; 30:413 - 6.
12. Yasmineh WG, Lewis L, Apple FS. Chromatographic behavior of immunoglobulin - creatine kinase on DEAE - Sephadex A - 50. *Clin Chim Acta* 1984; 144: 29-37.
13. Apple FS, Rogers MA, Sherman WM, Casal DC, Ivy JL. Creatine kinase MB isoenzyme adaptations in stressed human skeletal muscle. *J Appl Physiol* 1985; 59: 149-53.
14. Coe JI, Apple FS. Variation in vitreous chemical values due to instrumentation. *J Forens Sci* 1985; 30: 828-35.
15. Rogers MA, Apple FS. Creatine kinase isoenzyme activities in men and women following a 42.2 Km race. *Med Sci Sports Exer* 1985; 17: 679-82.
16. Lampe JW, Slavin JL, Apple FS. Poor iron status of women runners training for a marathon. *Intl J Sports Med* 1986; 7: 111-4.
17. Apple FS, Rogers MA. Creatine kinase isoenzyme MM in skeletal muscle and plasma from marathon runners. *Clin Chem* 1986; 32: 41-4.
18. Apple FS, Bandt C, Prosch A, Erlandson G, Holmstrom V, Scholen J, Googins MK. Creatinine clearance: enzymatic vs Jaffe determinations of creatinine in plasma and urine. *Clin Chem* 1986; 32: 388-90.
19. Apple FS, Rogers MA. Skeletal muscle lactate dehydrogenase isozyme alterations in men and women runners. *J Appl Physiol* 1986; 61: 477-81.
20. Apple FS, Rogers MA. Mitochondrial creatine kinase activity alterations in skeletal muscle during long distance running. *J Appl Physiol* 1986; 61: 482-5.

21. Lampe JW, Slavin JL, Apple FS. Elevated serum ferritin concentrations in master runners after a marathon race. *Internat J Vit Nutr Res* 1986; 56: 395-8.
22. Lampe JW, Slavin JL, Apple FS. Effects of moderate iron supplementation on the iron status of runners with low ferritin levels. *Nut Report Intl* 1986; 34: 959-66.
23. Clarkson PM, Apple FS, Byrnes WC, McCormick KM, Triffletti P. Creatine kinase isoforms following isometric exercise. *Muscle and Nerve* 1987; 10: 41-4.
24. Apple FS, Rogers MA, Casal DC, Lewis L, Ivy JL, Lampe JW. Skeletal muscle creatine kinase MB alterations in women marathon runners. *Eur J Appl Physiol* 1987; 56: 49-52.
25. Apple FS, Sharkey SW, Werdick M, Elspenger J, Tillbury RT. Analysis of creatine kinase isoenzymes and isoforms in serum to detect reperfusion after acute myocardial infarction. *Clin Chem* 1987; 33: 507-11.
26. Schneider C, Stull GA, Apple FS. Kinetic characterization of human heart and skeletal muscle CK isoenzymes. *Enzyme* 1988; 39: 220-6.
27. Apple FS, Bandt CM. Liver and blood postmortem tricyclic antidepressant concentrations. *Am J Clin Path* 1989; 89: 794-6.
28. Apple FS, Hellsten Y, Clarkson PM. Early detection of skeletal muscle injury by assay of creatine kinase MM isoforms in serum after acute exercise. *Clin Chem* 1988; 34: 1102-04.
29. Apple FS, Rhodes MD. Enzymatic estimation of skeletal muscle damage by analysis of changes in serum creatine kinase. *J Appl Physiol* 1988; 65: 2598-2600.
30. Sharkey SW, Apple FS, Elspenger KJ, Tilsury RT, Miller S, Fjeldos K, Asinger RW. Early peak of creatine kinase - MB in acute myocardial infarction with a non-diagnostic electrocardiogram. *Am Heart J* 1988; 116:1207-11.
31. Apple F, Preese L, Bennett R, Fredrickson A. Clinical and analytical evaluation of two immunoassays for direct measurement of creatine kinase MB with monoclonal anti-CK-MB antibodies. *Clin Chem* 1988; 34: 2364-6.
32. Sharkey SW, Elspenger KJ, Murakami M, Apple FS. Canine myocardial creatine kinase isoenzyme response to coronary artery occlusion. *Am J Physiol* 1989; 256: H508-14.
33. Eastep SJ, Benson PJ, Preese LM, Apple FS. Factitiously high sodium activities on the Ektachem 400 owing to interferences by high gamma-globulin concentrations. *Clin Chem* 1989; 35: 333-4.

34. Apple FS, Abraham PA, Rosono TG, Halstenson CE. Assessment of renal function by inulin clearance: comparison with creatine clearance as determined by enzymatic methods. *Clin Chem* 1989; 35: 312-14.
35. Apple FS, Tesch PA. CK and LD isoenzymes in human single muscle fibers in athletes. *J Appl Physiol* 1989; 66: 2717-20.
36. Apple FS. Postmortem tricyclic antidepressant concentrations: assessing cause of death using parent drug to metabolite ratio. *J Analyt Tox* 1989; 13: 197-8.
37. Apple FS, Roe SJ. Cocaine-associated fetal death in utero. *J Analyt Tox* 1990; 14:259-60.
38. Apple FS, Preese LM, Riley L, Gerken KL, VanLente F. Clinical and financial impact of a rapid CK-MB specific immunoassay on the diagnosis of myocardial infarction. *Arch Path Lab Med* 1990; 114: 1017-1020.
39. Sjodin B, Westing YH, Apple FS. Formation of oxygen free radicals during exercise. *Sports Med* 1990; 10: 236-54.
40. Lampe JW, Slavin JL, Apple FS. Iron status in active women: the effect of running a marathon on bowel function and gastrointestinal blood loss. *Int J Sport Med* 1991; 12:173-9.
41. Sharkey SW, Murakami MA, Smith S, Apple FS. Canine myocardial creatine kinase isoenzyme redistribution three weeks after coronary occlusion: biochemical and ultrastructural correlates. *Circulation* 1991; 84: 333-40.
42. Apple F, Benson, P, Preese L, Eastep S, Heiler G, Bilodeau L. Lipase and pancreatic amylase activities in tissues and in patients with hyperamylasemia. *Am J Clin Path* 1991; 96: 610-4.
43. Apple FS, Hyde JE, Ingersoll AM, Stone J, Theologides A. Geographic distribution of xanthine oxidase, free radical scavenger, creatine kinase and lactate dehydrogenase enzyme systems in rat heart and skeletal muscle. *Am J Anat* 1991; 192: 319-23.
44. Apple FS. Acute myocardial infarction and coronary reperfusion: serum cardiac markers for the 1990s. *Am J Clin Path* 1992; 97: 217-26.
45. Nosaka K, Clarkson PM, Apple FS. Time course of serum protein changes after strenuous exercise of the forearm flexors. *J Lab Clin Med* 1992; 119: 183-8.
46. Apple FS. The creatine kinase system in overtrained runners. *Clin Physiol* 1992; 12: 1-6.
47. Bilodeau L, Grotte DA, Preese LM, Apple FS. Glycerol interference in serum lipase assay falsely indicates pancreas injury. *Gastroenterology* 1992; 103: 1066-7.

48. Balla G, Jacob HS, Balla J, Rosenberg M, Nath K, Apple F, Eaton J, Vercellotti GM. Ferritin: a cytoprotective antioxidant strategem of endothelium. *J Biol Chem* 1992; 267: 18148-53.
49. Schneider CM, Rogers MA, Lampe JW, Rhodes MC, Apple, FS. Serum creatine kinase isoenzyme measurements in master male and female marathon runners. *Sports Med Train Rehab* 1992; 3: 237-242.
50. Adams JE, Bodor GS, Davila-Roman VG, Delmez JA, Apple FS, Ladenson JH, Jaffe AS. Cardiac troponin I: A marker with high specificity for cardiac injury. *Circulation* 1993; 88:101-6.
51. Wu AHB, Valdes R, Apple FS, Gornet T, Stone MA, Mayfield-Stokes S, Ingersoll-Stroibos AM, Wiler B. Cardiac troponin-T immunoassay for diagnosis of acute myocardial infarction. *Clin Chem* 1994; 40: 900-907.
52. Apple FS, Billadello JJ. Creatine Kinase M and B subunit mRNA levels in exercise trained rat skeletal muscle. *Life Sci* 1994; 55: 585-92.
53. Apple FS, Preese LM. Creatine kinase MB: detection of AMI and monitoring reperfusion. *J Clin Immunoassay* 1994; 17: 24-29.
54. Theologides A, Ingersoll-Stroubos AM, Apple FS. TNF - effect on oxygen free radical scavenging and generating enzymes in rat liver. *Biochem Mol Biol Internal* 1994; 33: 205-210.
55. Apple FS, Bilodeau L, Preese LM, Benson P. Clinical implementation of a rapid, automated assay for assessing fetal lung maturity. *J Reprod Med* 1994; 39: 883 - 7.
56. Apple FS, Voss E, Lund L, Preese L, Berger CR, Henry TD. Cardiac troponin, CK-MB and myoglobin for early detection of acute myocardial infarction and monitor of reperfusion following thrombolytic therapy. *Clin Chim Acta* 1995; 237: 59-66.
57. Apple FS. Glycogen phosphorylase BB and other cardiac proteins: challenges to creatine kinase MB as the marker for detecting myocardial injury. *Clin Chem* 1995; 41: 13 - 5.
58. Voss EM, Sharkey SW, Gernert A, Murakami MA, Johnston RB, Hsieh CC, Apple FS. Human and canine cardiac troponin T and CK-MB distribution in normal and diseased myocardium: infarct sizing using serum profiles. *Arch Path Lab Med*, 1995; 119:799-806.
59. Apple FS, Sharkey SW, Henry TD. Early serum cardiac troponin I and T concentrations following successful thrombolysis for acute myocardial infarction. *Clin Chem* 1995; 41: 1197-8.
60. Bodor GS, Porterfield D, Voss E, Smith S, Apple FS. Cardiac troponin I is not expressed in fetal and adult human skeletal muscle tissue. *Clin Chem* 1995; 41: 1710 - 5.

61. Apple FS, Henry TD, Berger CR, Landt YV. Early monitoring of coronary reperfusion following thrombolytic therapy by measurement of cardiac troponin I, creatine kinase MB and myoglobin. *Am J Clin Path* 1996; 105: 6-10.
62. Apple FS, Wu AHB, Valdes R. Serum cardiac troponin T concentrations in hospitalized patients without acute myocardial infarction. *Scand J Clin Lab Invest* 1996; 56: 63-8
63. McLaurin M, Apple FS, Henry TD, Sharkey SW. Cardiac troponin I and T levels in patients with cocaine associated chest pain. *Ann Clin Biochem* 1996; 33: 183-6.
64. Hellsten Y, Apple FS, Sjodin B. The effect of sprint cycle training on activities of antioxidant enzymes in human skeletal muscle. *J Appl Physiol* 1996; 81: 1484-7.
65. Apple FS, Lowe MC, Googins MK, Kloss J. Serum thiocyanate concentrations in normal and renal impaired patients receiving nitroprusside. *Clin Chem* 1996; 42: 1878-9.
66. Tucker JF, Collins RA, Anderson AJ, Hauser J, Kalas J, Apple FS. Early diagnostic efficiency of cardiac troponin I and cardiac troponin T for acute myocardial infarction. *Acad Emerg Med* 1997; 4:13-21.
67. Apple FS, Sharkey SW, Hoeft P, Skeate R, Voss EM, Dahlmeier BA, Preese LM. Prognostic value of serum cardiac troponin I and T in chronic dialysis patients: a one year outcomes analysis. *Am J Kid Dis* 1997; 29: 399-403.
68. Bodor GS, Survant L, Voss EM, Smith S, Posterfield D, Apple FS. Cardiac troponin-T composition in normal and regenerating human skeletal muscle. *Clin Chem* 1997;43:476-84.
69. McLaurin MD, Apple FS, Voss EM, Herzog CA, Sharkey SW. Serum cardiac troponin I, cardiac troponin T, and CK MB in dialysis patients without ischemic heart disease: evidence of cardiac troponin T expression in skeletal muscle. *Clin Chem* 1997; 43: 976 - 82.
70. Ricchiuti V, Zhang J, Apple FS. Cardiac troponin I and T alterations in hearts with severe left ventricular remodeling. *Clin Chem* 1997; 43: 990-5.
71. Hoang CD, Zhang J, Payne RM, Apple FS. Post-infarction left ventricular remodeling induces changes in creatine kinase mRNA and protein subunit levels in porcine myocardium. *Am J Pathol* 1997; 151: 257-64.
72. Apple FS, Falahati A, Paulson PR, Miller E, Sharkey SW. Improved detection of minor ischemic myocardial injury with measurement of serum cardiac troponin I. *Clin Chem* 1997; 43: 2047-51.
73. Christenson RH, Apple FS, Morgan DL, Alonsozana GL, Mascotti K, Olson M, McCormack RT, Wians FH, Keffer JH, Duh SH. Cardiac troponin I measurement on the Access immunoassay system: analytical and clinical performance characteristics. *Clin Chem* 1997; 44: 52-60.

74. Apple FS, Sharkey SW, Falahati A, Murakami MA, Mitha N, Christenson D. Assessment of left ventricular function using serum cardiac troponin I measurements following myocardial infarction. *Clin Chim Acta* 1998; 272: 59-67.
75. Henderson AR, Gerhardt W, Apple FS. Summary with extrapolations of a roundtable on the use of biochemical markers in the diagnosis and therapy of monitoring of patients with ischemic heart disease. *Clin Chim Acta* 1998; 272: 93-100.
76. Wu AHB, Feng YJ, Moore R, Apple FS, McPherson PH, Buechler KF, Bodor G. Characterization of cardiac troponin subunit release into serum after acute myocardial infarction and comparison of assays for troponin T and I. *Clin Chem* 1998; 44:1198-1208.
77. Ricchiuti V, Sharkey SW, Murakami MA, Voss EM, Apple FS. Cardiac troponin I and T alterations in dog hearts with myocardial infarction: correlation with infarct size. *Am J Clin Path* 1998; 110: 241-7.
78. McLaurin MD, Apple FS, Falahati A, Murakami MA, Miller EA, Sharkey SW. Cardiac troponin I and creatine kinase MB mass to rule out myocardial injury in hospitalized patients with renal insufficiency. *Am J Cardiol* 1998; 82: 973 - 5.
79. Ricchiuti V, Voss EM, Ney A, Odland M, Anderson PAW, Apple FS. Cardiac troponin T isoforms skeletal muscle of renal diseased patients will not cause false positive serum results by the second generation cardiac troponin T assay. *Eur Heart J* 1998; 19(suppl N): N30-3.
80. Apple FS, Ricchiuti V, Voss EM, Ney A, Odland M, Anderson PAW. Expression of cardiac troponin T isoforms expressed in renal diseased skeletal muscle will not cause false positive results by the second generation cardiac troponin T assay by Boehringer Mannheim. *Clin Chem* 1998; 44: 1919-24.
81. Falahati A, Sharkey SW, Christensen D, McCoy M, Miller E, Murakami MA, Apple FS. Implementation of cardiac troponin I for detection of acute myocardial injury in an urban medical center. *Am Heart J* 1999; 137: 332-7; letter to editor correction 1999; 138: 798-800.
82. Apple FS, Christenson RH, Valdes Jr R, Andriak AJ, Duh SH, Feng YJ, Koplen B, Jortani SA, Johnson NA, Berg A, Mascotti K, Wu AHB. Simultaneous rapid measurement of whole blood myoglobin, creatine kinase MB, and cardiac troponin I by the Triage Cardiac Panel for detection of myocardial infarction. *Clin Chem* 1999; 45: 199-205.
83. Apple FS, Maturen AJ, Mullins RE, Painter PC, Pessin-Minsley MS, Webster RA, Flores JS, DeCresce R, Fink DJ, Buckley PM, Marsh J, Ricchiuti V, Christenson RH. Multicenter clinical and analytical evaluation of the AxSYM troponin I immunoassay to assist in the diagnosis of myocardial infarction. *Clin Chem* 1999; 45: 206-12.
84. Sheng WS, Lin YC, Apple FS, Hy S, Peterson PK, Chao CC. Brain energy stores in

- C57BL/6 mice after c. parvum injection. *Neuroreport* 1999; 10: 177-181.
85. Wu AHB, Apple FS, Gibler WB, Jesse RL, Warshaw MM, Valdes Jr R. National academy of clinical biochemistry standards of laboratory practice: recommendations for use of cardiac markers in coronary artery diseases. *Clin Chem* 1999; 45: 1104-21.
  86. Apple FS. Biochemical markers of thrombolytic success. *Scand J Clin Lab Invest* 1999; 59 (suppl 230) 60-6.
  87. Panteghini M, Apple FS, Christenson RH, Dati F, Mair J, Wu AH. Proposals from IFCC committee on standardization of markers of cardiac damage (C-SMCD): recommendations on use of biochemical markers of damage in acute coronary syndrome. *Scand J Clin Lab Invest* 1999; 59 (suppl 230) 103-12.
  88. Dati F, Panteghini M, Apple FS, Christenson RH, Mair J, Wu AH. Proposals from IFCC committee on standardization of markers of cardiac damage (C-SMCD): strategies and concepts on standardization of cardiac marker assays. *Scand J Clin Lab Invest* 1999; 59 (sup 230) 113-23.
  89. Apple FS. Tissue specificity of cardiac troponin I, cardiac troponin T, and creatine kinase MB. *Clin Chim Acta* 1999; 284: 151-9.
  90. Christenson RH, Vaidya H, Landt Y, Bauer RS, Green SF, Apple FS, Jacob A, Magnuson GR, Nag S, Wu AHB, Azzazy HME. Standardization of creatine kinase MB (CK MB) mass assays: the use of recombinant CK MB as a reference material. *Clin Chem* 1999; 45: 1414-23
  91. Ricchiuti V, Apple FS. RNA expression of cardiac troponin T isoforms in diseased human skeletal muscle. *Clin Chem* 1999; 45: 2129-35.
  92. Apple FS. Clinical and analytical standardization issues confronting cardiac troponin I. *Clin Chem* 1999; 45: 18-20.
  93. Siegel AJ, Sholar MB, Mendelson JH, Lukas SE, Kaufman MJ, Renshaw PF, McDonald JC, Lewandrowski KB, Apple FS, Stec JJ, Lipinski I, Tofler GH, Ridker PM. Cocaine induced erythrocytosis and increase in von Willebrand factor. *Arch Intern Med* 1999; 159: 1925-30.
  94. Wu AHB, Holtman V, Apple FS, Ricchiuti V, DiBello PM, Jacobsen D. Multicenter analytical evaluation of the automated IMx assay for total plasma homocysteine. *Ann Clin Lab Sci* 2000; 30: 185-90.
  95. Apple FS. The specificity of biochemical markers of cardiac damaged: a problem solved. *Clin Chem Lab Med* 2000; 37: 1085-9.
  96. Apple FS, Koplen B, Murakami MA. Preliminary evaluation of the Ortho ECi cardiac troponin I immnuodiagnostic assay. *Clin Chem* 2000; 46: 572-4.

97. Mackey-Bojack S, Kloss J, Apple FS. Cocaine, cocaine metabolites, and ethanol concentrations in postmortem blood and vitreous humor. *J Anal Tox* 2000; 24: 59-65.
98. Chen YJ, Serfass RC, Apple FS. Alterations in the expression and activity of creatine kinase-M and mitochondrial creatine kinase subunits in skeletal muscle following prolonged intense exercise in rats. *Eur J Appl Physiol* 2000; 81: 114-9.
99. Chen YJ, Serfass RC, Mackey-Bojack SM, Kelly KL, Titus JL, Apple FS. Cardiac troponin T alterations in myocardium and serum of rats following stressful, prolonged intense exercise. *J Appl Physiol* 2000, 88: 1749-55.
100. Chen YJ, Serfass RC, Apple FS. Loss of myocardial CK-MB into the circulation following 3.5 hours of swimming in a rat model. *Int J Sports Med* 2000; 21: 1-5.
101. Stelow EB, Johari VP, Smith SA, Crosson JT, Apple FS. Propofol-associated rhabdomyolysis with cardiac involvement in adults: chemical and anatomic findings. *Clin Chem* 2000; 46: 577-81.
102. Jaffe AS, Ravkilde J, Roberts R, Naslund U, Apple FS, Galvani M, Katus H. It's time for a change to a troponin standard. *Circulation* 2000, 102: 1216-20
103. Apple FS, Anderson FP, Collinson P, Jesse RL, Kontos MC, Levitt MA, Miller EA. Clinical evaluation of the First Medical whole blood, point of care testing device for detection of myocardial infarction. *Clin Chem* 2000, 46: 1604-9.
104. Joint European Society of Cardiology/American College of Cardiology Committee (Apple FS member Biochemistry section). Myocardial infarction redefined – a consensus document of the Joint European Society of Cardiology/American College of Cardiology Committee for the redefinition of myocardial infarction. *J Am Coll Cardiol* 2000; 36: 959-69.
105. Joint European Society of Cardiology/American College of Cardiology Committee (Apple FS member Biochemistry section). Myocardial infarction redefined – a consensus document of the Joint European Society of Cardiology/American College of Cardiology Committee for the redefinition of myocardial infarction. *Europ Heart J* 2000; 21: 1502-13.
106. Miller R, Callas DD, Kahn SE, Ricchiuti V, Apple FS. Evidence of myocardial damage in mummified human tissue. *JAMA* 2000; 284: 831-2.
107. Ricchiuti V, Shear W, Henry TD, Paulson PR, Miller EA, Apple FS. Monitoring plasma cardiac troponin I for the detection of myocardial injury after percutaneous transluminal coronary angioplasty. *Clin Chim Acta* 2000; 302: 161-70.
108. Burt M, Anderson DC, Kloss J, Apple FS. Evidence based implementation of free

- phenytoin therapeutic drug monitoring. *Clin Chem* 2000; 46: 1132-5.
109. Beuerle JR, Azzazy H, Apple FS, Duh SH, Tan A, Christenson RH. Performance characteristics of a new myoglobin microparticle immunoassay: a multicenter evaluation. *Clin Biochem* 2000; 33: 595-8.
  110. Apple FS, Murakami M, Panteghini M, Christenson RH, Dati F, Mair J, Wu AH. International survey on the use of cardiac markers. *Clin Chem* 2001; 47: 587-9.
  111. Christenson RH, Duh SH, Apple FS, Bodor G, Bunk D, Dalluge J, Panteghini M, Potter J, Welch M, Wu AHB, Kahn S. Standardization of cardiac troponin I assays: round robin performance of ten candidate reference materials. *Clin Chem* 2001; 47: 431-7.
  112. Burt MJ, Kloss J, Apple FS. Postmortem blood free and total morphine concentrations in medical examiners cases. *J Forensic Sci* 2001; 46: 1138-42.
  113. Christenson RH, Duh SH, Sanhai W, Wu AHB, Holtman V, Painter P, Branham E, Apple FS, Murakami MA, Morris DL. Characteristics of an albumin cobalt binding test for assessment of acute coronary syndrome patients: a multicenter study. *Clin Chem* 2001; 47: 464-70.
  114. Apple FS, Wu AHB. Myocardial infarction redefined: role of cardiac troponin testing. *Clin Chem* 2001; 47: 377-9.
  115. Davis GK, Labugger R, Van Eyk JE, Apple FS. Cardiac troponin T is not detected in Western blots of diseased renal tissue. *Clin Chem* 2001; 47: 782-4.
  116. Panteghini M, Gerhardt W, Apple FS, Dati F, Ravkilde J, Wu AH. Quality specifications for cardiac troponin assays. *Clin Chem Lab Med* 2001; 39:175-9.
  117. Davis G, Park K, Kloss J, Apple FS. Tricyclic antidepressant fatality: role of measuring postmortem tissue concentration. *J Toxicology* 2001; 39: 44-5.
  118. Apple FS. Cardiac troponin assays: analytical issues and clinical reference range cutpoints. *Cardiovas Tox* 2001; 1: 93-8.
  119. Herzog CA, Apple FS. Cardiac biomarkers in the new millennium. *Seminars Dial* 2001; 14: 322-3.
  120. Wu AHB, Morris DL, Fletcher DR, Apple FS, Christenson RH, Painter PC. Analysis of the albumin cobalt binding (ACB) test as an adjunct to cardiac troponin I for the early detection of myocardial infarction. *Cardiovas Tox* 2001; 1: 147-52.
  121. Frantz CR, Powell C, Karon B, Parvin CA, Hankins K, Dayal M, Sadovsky Y, Johari V, Apple FS, Gronowski AM. Assessment of the diagnostic efficiency of the TDx-FLM II to predict fetal lung maturity. *Clin Chem* 2002; 48: 761-5.
  122. Uettwiller-Geiger D, Wu AHB, Apple FS, Jevans AW, Venge P, Olson MD, Darte C, Woodrum DL, Roberts S, Chan S. Analytical performance of Beckman Coulter's Access

- AccuTnI (troponin I) in a multicenter evaluation. *Clin Chem* 2002; 48: 869-76.
123. Apple FS, Wu AHB, Jaffe AS. European Society of Cardiology and American College of Cardiology guidelines for redefinition of myocardial infarction: how to use existing assays clinically and for clinical trials. *Am Heart J* 2002; 144: 981-6.
  124. Apple FS, Quist WE, Mathews WE, Otto A, Murakami MM. Release characteristics of cardiac biomarkers and ischemia modified albumin as measured by the albumin cobalt binding test following a marathon race. *Clin Chem* 2002; 48: 1097-1100.
  125. Knoblock R, Lehman C, Smith R, Apple FS, Roberts WL. False positive AxSYM cardiac troponin I result in a 59 year old woman. *Arch Path Lab Med* 2002; 126: 606-9.
  126. Apple FS, Murakami MM, Jesse RL, Levitt MA, Collinson P. Risk assessment of patients with acute coronary syndromes utilizing a near bedside whole blood cardiac troponin I assay. *Clin Chem* 2002; 48: 1784-7.
  127. Apple FS, Murakami MM, Pearce LA, Herzog CA. Predictive value of cardiac troponin I and T for subsequent death in end stage renal disease. *Circulation* 2002; 106: 2941-5.
  128. Fishbein MC, Wang T, Matijaevic M, Hong L, Apple FS. An immunohistochemical study in experimental models of myocardial ischemia. *Cardiovas Path* 2003; 12: 65-71
  129. Apple FS, Trinity E, Steen J, Praver S, Wu AHB. BNP test utilization in CHF in community hospital practice. *Clin Chim Acta* 2003; 328: 191-3.
  130. Gagajewski A, Apple FS. Methadone related deaths in Hennepin County, 1992-2002. *J Forens Sci* 2003; 48: 668-71.
  131. Apple FS, Johari V, Hoybook KJ, Weber-Shrikant E, Davis GK, Murakami MM. Operationalizing cardiac troponin I testing along ESC/ACC consensus guidelines for defining myocardial infarction. *Clin Chim Acta* 2003; 331: 165-6.
  132. Apple FS, Quist HE, Doyle PJ, Otto AP, Murakami MM. Plasma 99<sup>th</sup> percentile reference limits for cardiac troponin and creatine kinase MB mass for use with European Society of Cardiology/American College of Cardiology consensus recommendations. *Clin Chem* 2003; 49: 1331-6
  133. Apple FS, Murakami MM, Quist H, Pearce LA, Wieczorek S, Wu AHB. Prognostic value of the Ortho Vitros Troponin I assay in patients with symptoms of myocardial ischemia: risk stratification using ESC/ACC recommended cutoff values. *Am J Clin Path* 2003; 120: 114-20.
  134. Gagajewski A, Apple FS. Amphetamines: role of toxicology testing for assisting in medical examiner cases. *J Clin Lig Assay* 2003; 26: 25-9.
  135. Yeo KTJ, Wu ANB, Apple FS, Kroll MH, Christenson RH, Lewandrowski KB, Sedor

- FA, Butch AW. Multicenter evaluation of the Roche NT-proBNP assay and comparison to the Biosite BNP assay. *Clin Chim Acta* 2003; 338: 107-15.
136. Gagajewski A, Murakami MM, Kloss J, Edstrom M, Hiller M, Peterson GF, Amatuzio J, Apple FS. Measurement of chemical analytes in vitreous humor: stability and precision studies. *J Forens Sci* 2004; 49: 371-4.
  137. Aslan D, Apple FS, Ischemia modified albumin: clinical and analytical update. *Lab Med* 2004;35: 1-5.
  138. Luepker RV, Apple FS, Christenson RH, Crow RS, Fortmann SP, Goff D, Goldberg RJ, hand MM, Jaffe AS, Julian DG, Levy D, Manolio T, Mendis S, Mensah G, Pajak A, Prineas RJ, Reddy KS, Roger VL, Rosamond WD, Shahar E, Sharrett AR, Sorlie P, Tunstall-Pedoe H. Case definitions for acute coronary heart disease in epidemiology and clinical research studies. *Circulation* 2003; 108: 2543-9.
  139. Apple FS, Quist H, Murakami MM. Diagnostic and prognostic value of Ortho Vitros Troponin I and Beckman Access AccuTnI assay in patients admitted with symptoms suggestive of acute coronary syndrome. *Arch Path Lab Med* 2004; 128: 430-4.
  140. Lin JC, Apple FS, Murakami MM, Luepker RV. Rates of positive cardiac troponin I and creatine kinase MB among patients hospitalized for suspected acute coronary syndromes. *Clin Chem* 2004; 50: 333-8.
  141. Panteghini M, Pagani F, Yeo KT, Apple FS, Christenson RH, Dati F, Mair J, Ravkilde J, Wu AHB. Evaluation of the imprecision at low range concentrations of the assays for cardiac troponin determination. *Clin Chem* 2004; 50: 327-32.
  142. Panteghini M, Linsinger T, Wu AHB, Dati F, Apple F, Christenson RH, Mair J, Schimmel H. Standardization of immunoassays for measurement of myoglobin in serum. Phase I: evaluation of candidate reference materials. *Clin Chim Acta* 2004; 341; 65-72..
  143. Apple FS, Kleinfeld AM, Adams III J. Unbound free fatty acid concentrations are increased in cardiac ischemia. *Clin Proteomics* 2004; 1: 169-72.
  144. Ricchiuti V, Voss EM, Ney A, Odland M, Apple FS. Skeletal muscle expression of creatine kinase-B in end stage renal disease. *Clin Proteomics* 2004; 1: 161-7.
  145. Apple FS, Murakami MM, Christenson RH, Campbell JL, Miller CJ, Hock KG, Scott MG. Analytical performance of the i-STAT cardiac troponin I assay. *Clin Chim Acta* 2004; In press.
  146. Wu AHB, Smith A, Apple FS. Optimum blood collection intervals for B-type natriuretic peptide testing in heart failure patients. *Am J Cardiol* 2004; In press.
  147. Apple FS, Murakami MM. Serum 99<sup>th</sup> percentile cutoffs for seven cardiac troponin assays. *Clin Chem* 2004; In press.

148. Apple. Analytical issues for cardiac troponins. Prog Cardiovas Dis 2004; Accepted.

#### SUBMITTED / IN PREPARATION RESEARCH REPORTS

1. Duncanson E, Apple FS. Guidelines for forensic ethanol interpretations. Clin Chem, submitted.
2. Proprietary information deleted.

#### REVIEW ARTICLES, BOOK CHAPTERS, INVITED ARTICLES

1. Apple FS. Creatine kinase: muscle soreness and the marathoner. The Melpomene Report 1984; 3: 10-2.
2. Apple FS, Rogers MA. Skeletal muscle may contribute to CK activity in women runners. 1985; Orthopedics Today, September, p 23-6.
3. Apple FS. Athletes enzyme abnormalities can mimic disease. Clin Chem News 1987; 13: 9-12.
4. Apple FS. Creatine Kinase MM Isoforms. Clin Chem News 1988; 14: 8.
5. Apple FS. Diagnostic use of CK-MM and CK-MB isoforms for detecting myocardial infarction. Clin Lab Med 1989; 9: 643-54.
6. Riley L, Apple FS. Beriberi: a case study with laboratory findings. Clin Chem News 1990; 12: 12-3.
7. Apple FS. Joint research can provide academic credibility. Clin Chem News 1990; 16: 5.
8. Apple FS. Sports medicine in clinical chemistry. Health Education Resources. AACC Press, Washington DC, 1991, p 55-60.
9. Apple FS. Enzymatic diagnosis of myocardial infarction: new perspectives with creatine kinase isoenzymes. Adv Hosp Technol 1990; 2: 33-6.
10. Apple FS. Cardiovascular disorders: acute myocardial infarction. Anal Chem 1991; 63: 165R-173R.
11. Apple FS. CK-MB remains the gold standard for the diagnosis of AMI and reperfusion. Test trends 1991; 5: 3-4.
12. Apple FS. Serum CK-MB assays, myocardial infarction and reperfusion. Clin Chem News 1991; 17: 13-14.
13. Apple FS. Creatine kinase MB. Lab Med 1992; 23: 298-302.

14. Apple FS, Preese LM, Shaw G. Monitoring cardiac enzyme ordering patterns: a quality assurance monitor. *Clin Chem News* 1993; 4: 5.
15. Apple FS. Monitoring acute pancreatitis: current laboratory tools. *J Int Fed Clin Chem* 1993; 5: 155.
16. Apple FS, Bilodeau LL. Cardiac markers for diagnosing and monitoring heart disease. *AACC Study Guide*, Washington DC 1994; 1-73.
17. Apple FS, Lowe M. Are cyanide and thiocyanate toxicities a concern in patients receiving nitroprusside. *J Int Fed Clin Chem* 1994; 6: 191 - 2.
18. Apple FS, Kloss J. Uncommon matrices aid postmortem study. *Forensic Urine Drug Test* 1994; 4: 1 - 5.
19. Apple FS. Book Review, *Clin Chem* 41:1995; DORA 94-96: Directory of rare analysis.
20. Apple FS. Cardiac troponin I, In: AHB Wu, ed. *Cardiac Markers*, Totowa, NJ, Human Press, 1998: 249 -3.
21. Apple FS. Value of soluble markers in the diagnosis of reperfusion after thrombolysis. In: Kaski JC, Holt DW, Eds. *Myocardial damage: early detection by novel biochemical markers*, Dordrecht, The Netherlands, Kluwer Academic, 1998:
22. Apple FS. Clinical and analytical standardization issues confronting cardiac troponin I [opinion]. *Clin Chem* 1999; 45: 18-20.
23. Ricchiuti V, Apple FS. Advances in use of cardiac troponins in coronary artery disease. *Adv Admin Lab* 1999; 8: 67-73.
24. Apple FS. Creatine kinase isoforms and myoglobin: early detection of myocardial infarction and reperfusion. *Cor Art Dis* 1999; 10: 75-79.
25. Apple FS, Henderson AR. Cardiac Function, in Tietz' *Textbook of Clinical Chemistry*, Burtis C, Ashwood E, eds., Saunders, 3rd Ed, 1999, p1178-1203.
26. Apple FS, Cardiac Function, in: Tietz' *Fundamental's of Clinical Chemistry*, Burtis C, Ashwood E, eds., 3rd ed, WB Saunders, Philadelphia PA, 2001, p682-97.
27. Apple FS, Adams III JE, Wu AHB, Jaffe AS. Report on a survey of analytical and clinical characteristics of commercial cardiac troponin assays, in: *Markers in Cardiology: Current and Future Clinical Applications*, Apple FS, Adams III, Wu AHB, Jaffe AS, eds, Futura, Armonk, NY, 2001; p31-4.
28. Apple FS. The role of cardiac troponin testing in renal disease, in: *Markers in Cardiology: Current and Future Clinical Applications*, Apple FS, Adams III, Wu AHB, Jaffe AS, eds, Futura, Armonk, NY, 2001; p 203-9.

29. Apple FS. Cardiac troponin: redefining the detection of myocardial infarction. *Am Clin Lab* 2002; 21: 32-4.
30. Apple FS. On site evaluation of chest pain using biomarkers of myocardial injury, in “Principles and practice of point of care testing”, Kost GJ ed., Lippincott, Williams, and Wilkins, Philadelphia 2002, p 181-93.
31. Trinity E, Apple FS. Brain natriuretic peptide: diagnosis and management of congestive heart failure. *Point of Care* 2002; 1: 246-52.
32. Trinity E, Apple FS. Brain natriuretic peptide in diagnosis and management of congestive heart failure. *Lab Med* 2002; 33: 11-4.
33. Adams J, Apple FS. Cardiology patient page: New blood tests for heart disease. *Circulation* 2004; 109: e12-4.

#### LETTERS TO THE EDITOR

1. Apple FS. Presence of creatine kinase MB isoenzyme during marathon training. *New Engl J Med* 1981; 305: 764-5.
2. Apple FS, Rogers MA. Serum and muscle alanine aminotransferase activities in marathon runners. *JAMA* 1984; 252: 626-7.
3. Apple FS, Googins MK, Kastner S, Nevala K, Edmondson S, Kloss J. Labetalol: false positive indices by EMIT - d.a.u. assay and toxicology lab A urine screen. *Clin Chem* 1985; 31: 1251-2.
4. Apple FS, Heiler G, Preese L. Falsely increased CK-MB results obtained with the new reformulated CK-MB wash IV solution in the Stratus analyzer. *Clin Chem* 1990; 36:405-6.
5. Bilodeau L, Preese LM, Apple FS. Does low total creatine kinase activity rule out myocardial infarction. *Ann Intern Med* 1992; 116: 523-4.
6. Apple FS, Preese LM. Elevated serum lipase activity implies damage to pancreas. *Clin Chem* 1992; 38: 602-3.
7. Apple FS, Googins MK, Resen D. Propylene glycol interference in gas-chromatographic assay of ethylene glycol. *Clin Chem* 1993; 39: 167.
8. Wu AHB, Apple FS, Valdez R. Cardiac troponin T and diagnostic test evaluation. *Clin Chem* 1994; 41: 636.
9. Apple FS. More on troponin T specificity. *Advance Lab Profession* 1996; 5: 10-11.
10. Roberts WL, Calcote CB, Holmstrom V, Narlock C, Apple FS. Prevention of analytical false positive increases of cardiac troponin I on the Stratus II analyzer. *Clin Chem* 1997;

- 43: 860-1.
11. Apple FS, Sharkey SW. Expression of cardiac troponin T in skeletal muscle. Clin Chem 1998; 44: 358-9.
  12. Bodor GS, Apple FS, Voss EM. Markers on myocardial damage. Clin Chem 1998; 44: 362-5.
  13. Davis G, Park K, Kloss J, Apple FS. Tricyclic antidepressant fatality: postmortem tissue concentrations. Clin Toxicol 2001; 39: 649-50.
  14. Apple FS, Jaffe AS. Bedside multimarker testing for risk stratification in chest pain units: the chest pain evaluation by CKMB, myoglobin, and troponin I (CHECKMATE) study. Circulation 2001; 104: e125-6.
  15. Gagajewski A, Davis GK, Kloss J, Poch GK, Anderson CJ, Apple FS. False positive LSD immunoassay screen due to fentanyl. Clin Chem 2002; 48: 205-6.
  16. Wu AHB, Apple FS. Cardiac troponin cutpoints: AMI diagnosis or risk stratification. Clin Chem 2002; 48: 2080-2.

ABSTRACTS (presenter underlined)

1. Ladenson JH, Koch DD, Apple FS. Relationship between flame photometric and direct potentiometric measurement of sodium. Clin Chem 27:1094, 1981; American Association for Clinical Chemistry (AACC) National Meeting, July 1981, Kansas City.
2. Apple FS, McGue MK. Chronic enzyme elevation during marathon training. Med Sci Sport Exer 14:163, 1982; American College of Sports Medicine (ACSM) National Meeting, May 1982, Minneapolis.
3. Apple FS, Koch DD, Graves S, Ladenson JH. Relationship between direct and indirect potentiometric measurement of sodium in blood. 14th Annual Symposium on Advanced Analytical Concepts for Clinical Laboratory, April, 1982, Gatlinburg, TN.
4. Apple FS, Walter FC, Dietzler DN. Serum creatinine concentration and the discrepancy between EMIT and GLC phenytoin levels. Clin Chem 28:1589, 1982, AACC, July 1983, Anaheim.
5. Apple FS, Rogers MA, Sherman WM, Ivy JL. Comparison of elevated serum creatine kinase MB activities post marathon race and post AMI. Med Sci Sport Exer 15:164, 1983; ACSM, May 1983, San Diego.
6. Apple FS, Rogers MA, Sherman WM, Ivy JL. Skeletal muscle CK isoenzyme composition in marathon runners. Clin Chem 29: 1270, 1983; AACC, July 1984, NYC
7. Apple FS, Shultz EK, Nelson KM, Bowers LD. Comparison of TDX, EMIT, and HPLC

- measurements of free phenytoin levels. Clin Chem 29:1239,1983;AACC, July1984. NYC
8. Apple FS, Rogers MA, Sherman WM, Ivy JL. Creatine kinase isoenzyme composition in skeletal muscle biopsies obtained from marathon runners. Fourth Intl Congress on Clinical Enzymol, July 1983, Washington DC.
  9. Apple FS, Rogers MA, Casal DC, Sherman WM, Ivy JL. Creatine kinase MB isoenzyme adaptations in stressed human skeletal muscle. Med Sci Sport Exer 16:201, 1984; ACSM, May 1984; Montreal, Canada.
  10. Rogers MA, Apple FS, Stull GA. CK isoenzyme elevations and clearance rates in men and women after a 42.2 Km race. Med Sci Sport Exer 16:186, 1984; ACSM May 1984, Montreal, Canada.
  11. Apple FS, Rogers MA, Yasmineh WG. Multiple forms of CK MM in skeletal muscle and serum from marathon runners. Clin Chem 30:1007, 1984; AACC, July 1984, Washington DC.
  12. Rogers MA, Apple FS. Serum ALT elevations in response to a marathon race. Clin Chem 30:1006, 1984; AACC, July 1984, Washington DC.
  13. Pentel P, Jentzen J, Apple F, Sievert J. Phenylpropanolamine induced myocardial necrosis in rats. AAPC/AACT/ABMT/CAPCC Annual Scientific Meeting, Oct 1984, San Diego.
  14. Clarkson PM, Apple FS, Byrnes WC, McCormick KM, Triffletti P. Serum CK MM variants following isometric exercise. Clin Physiol 5:17, 1985; Intl Biochemistry of Exerc Meeting, July 1985, Copenhagen, Denmark.
  15. Apple FS, Rogers MA, Ivy JL. Mitochondrial CK alterations in human skeletal muscle following endurance and marathon racing. Clin Physiol 5:15, 1985; Intl Biochemistry of Exer Meeting, July 1985, Copenhagen, Denmark.
  16. Apple FS, Rogers MA, Casal DC, Lampe JW, Ivy JL. Muscle CK isoenzyme alterations in women marathon runners. Med Sci Sport Exer 17:277, 1985; ACSM, May 1985, Nashville.
  17. Apple FS, Prosch A, Holmstrom V, Erlandson G, Scholen J, Googins MK. Instrumentation variations for postmortem chemistries of vitreous humor. Clin Chem 31:1021, 1985; AACC, July 1985, Atlanta.
  18. Apple FS, Googins MK. Toxicology test ordering patterns: computer utilization for laboratory staffing. Clin Chem 31: 1019, 1985; AACC, July 1986, Chicago.
  19. Lampe J, Slavin J, Apple F. Iron stores off older marathon runners and effects of marathon racing on serum ferritin levels. 69th Annual Meeting FASEB, April 1985, Anaheim.

20. Lampe JW, Slavin JL, Apple FS. Effects of moderate iron supplementation on the iron status of runners with low serum ferritin concentrations. *Med Sci Sport Exer* 18:443, 1986; ACSM May 1986, Indianapolis.
21. Schneider C, Stull GA, Apple FS. Kinetic comparison of human skeletal and heart muscle CK isoenzymes. *Med Sci Sport Exer* 18:405, 1986; ACSM May 1986, Indianapolis.
22. Apple FS, Rogers MA. Skeletal muscle lactate dehydrogenase isoenzyme alterations in marathon runners. *Med Sci Sport Exer* 18:438, 1986; ACSM May 1986, Indianapolis.
23. Sharkey SW, Apple FS, Asinger R, Elsperger J, Miller S, Werdick M. Early peak of CK MB in acute myocardial infarction without ST elevation. 52nd Annual Scientific Assembly Am College of Chest Physicians, September 1986, San Francisco.
24. Apple FS, Sharkey S, Werdick M, Elsperger J, Miller S, Asinger R. Reperfusion following acute myocardial infarction: detection by plasma CK MM1 and CK MB. *Clin Chem* 32:1127, 1986; AACC July 1986, Chicago.
25. Benson P, Apple F. Evaluation of the BMD creatinine - PAP method on a Cobas-Bio. *Clin Chem* 32: 1100, 1986; AACC July 1986, Chicago.
26. Hellsten Y, Apple F, Clarkson P. Early detection of skeletal muscle damage by analyses of serum CK MM isoforms. *Med Sci Sport Exer, Suppl* 19:175, 1987; ACSM May 1987, Vegas.
27. Lampe J, Ellefson M, Slavin J, Schwartz S, Apple F. The effect of marathon running on gastrointestinal transit time and fecal blood loss in women runners. *Med Sci Sport Exer Suppl* 19:122, 1987; ACSM May 1987, Las Vegas.
28. Davis PG, Ainsworth BE, Serfass RC, Apple FS. Effects of 1.6, 5, 10, 25, and 42.2 Km races on serum CK in male and female runners. *Med Sci Sport Exer Suppl* 19:179, 1987; ACSM May 1987, Las Vegas.
29. Apple FS, Rhodes M. Enzymatic estimation of skeletal muscle damage after marathon racing. *Med Sci Sport Exer Suppl* 19: 176, 1987; ACSM May 1987, Las Vegas.
30. Preese L, Apple F, Erlandson G, Odell J. Evaluation of Paramax CK - M inhibitory antibody single tablet assay for screening elevated serum CK MB activity. *Clin Chem* 33:522, 1987; AACC July 1987, San Francisco.
31. Googins MK, Apple FS. Storage stability of urine THC as measured by the EMIT urine cannabinoid assay. *Clin Chem* 33: 449, 1987; AACC July 1987, San Francisco.
32. Apple FS. Liver and serum postmortem tricyclic antidepressant levels. 24th International Meeting of the Intl Assoc Forensic Toxicologists, July 1987, Banff Canada.
33. Lampe J, Apple F, Slavin J. Determinants of iron status in sedentary women and

- marathon runners. *Med Sci Sport Exer Suppl* 20:18, 1988; ACSM May 1988, Dallas.
34. Apple FS, Abraham PA, Halstenson CE, Rosomo TG. Assessment of renal function by inulin and enzymatic creatinine clearance methods. *Clin Chem* 34:1204, 1988; July 1988, New Orleans.
  35. Preese L, Bennett R, Fredrickson A, Apple F. Evaluation of BD CK - MB immunoassay: comparison with magic lite and electrophoreses. *Clin Chem* 34:1283, 1988; July 1988, New Orleans.
  36. Googins MK, Apple FS. Postmortem blood and/liver TCA concentrations. *Clin Chem* 34:1270, 1988; July 1988, New Orleans.
  37. Apple FS, Preese LM, Gerken K, VanLente F. Clinical utility of a monoclonal anti-CK-MB antibody-based assay on the Stratus immunoassay system. *Clin Biochem* 22:404-5, 1989.
  38. Apple FS. Creatine kinase M and B subunit mRNAs and isoenzyme activity in exercised trained rat skeletal muscle. *Med Sci Sport Exer Suppl* 21:51, 1989.
  39. Apple FS, Murakami MA, Sharkey SW. Alterations of the CK-MB content in the heart after chronic coronary artery occlusion in the dog. *Clin Chem* 36:1129, 1990.
  40. Preese L, Renneke J, Apple FS. Evaluation of Abbott IMx CK-MB immunoassay: comparison with Baxter Stratus CK-MB, Hybritech Tandem II CK-MB and electrophoresis. *Clin Chem* 36: 1130, 1990.
  41. Googins MK, Roe SJ, Apple FS. Cocaine and benzoylecgonine concentrations in postmortem blood and liver. *Clin Chem* 36: 1023, 1990.
  42. Apple FS, Helseth PH, Preese LM. Detection of myocardial reperfusion by rapid serial CK-MB or total CK assays. *Clin Chem* 37:909-10, 1991 (Abstract 4).
  43. Bilodeau LL, Preese LM, Wolters SM, Narlock CA, Apple FS. Evaluation of the Amerlite CK-MB immunoassay. *Clin Chem* 37:914, 1991 (Abstract 27).
  44. Googins MK, Apple FS. Morphine and codeine concentrations in postmortem blood. *Clin Chem* 37:1010, 1991 (Abstract 477).
  45. Hyde JE, Ingersoll-Stroubel AM, Theologides A, Sharkey SW, Murakami MA, Apple FS. Automation and clinical application of xanthine oxidase and free radical scavenger enzymes. *Clin Chem* 37:1070-1, 1991 (Abstract 767).
  46. Balla G, Jacob HS, Balla J, Rosenberg N, Nath K, Apple F, Eaton JW, Vercellotti GM. Endothelial ferritin: a crucial defense against iron-driven oxidation. *Blood* 78 Suppl 1:396a, 1991 (Abstract 1573).
  47. Ferrington DA, Rutledge RA, Schneider CM, Apple FS. Effects of gender and estrogen

- administration on muscle CK activity in rat skeletal muscle. *Med Sci Sport Exer* 24:557, 1992.
48. Apple FS, Henry T, Bilodeau LL, Berger C, Wu A, Wang XM, Landt Y, Bodor G. Appearance of serum markers for reperfusion in acute myocardial infarction within two hours after thrombolytic therapy. *Clin Chem* 38:1074, 1992.
  49. Bilodeau, L, Preese L, Casey T, Apple F. Lipase and pancreatic amylase activities in tissues and in patients with hyperlipasemia. *Clin Chem* 38:984, 1992.
  50. Bilodeau L, Preese L, Benson P, Apple F. Guidelines for the clinical utility of the TDx FLM assay. *Clin Chem* 38:1074, 1992.
  51. Stone JA, Apple FS. Species specificity of commercial CK-MB assays. *Assoc Clin Scient*, Syracuse, NY, May 13, 1992.
  52. Apple FS. The role of the clinical laboratory in assisting the clinician in the early diagnosis of acute myocardial infarction. *Bioquimia Internacional*. 18:98, 1993. Presented at XI Congress of Latin America of Clinical Biochemistry, Acapulco, Mexico, June 6, 1993.
  53. Apple FS, Henry TD, Berger CR. Immunoassays for serum CK-MB: Application for the determination of reperfusion following thrombolytic therapy. *Ann Biol Clin Paris* 51:349, 1993. Presented at 10th IFCC Europ Congress of Clin Chem, Nice, France, April 1993.
  54. Valdez R, Stone MA, Mayfield-Stokes S, Wu A, Gornet T, Ingersoll-Stroubus A, Apple F. A multicenter analytical evaluation of the cardiac troponin-T ES 300 immunoassay. *Clin Chem* 39:1155, 1993 (Abstract 167).
  55. Wu AHB, Gornet T, Apple F, Ingersoll-Stroubus AM, Valdez R, Mayfield-Stokes S, Wiler B. Use of cardiac troponin-T in diagnosis of acute myocardial infarction: a multicenter clinical evaluation. *Clin Chem* 39:1159, 1993 (Abstract 188).
  56. Vaidya H, Apple F, Boches F., Christenson R, Jones K, Landt Y, Loyd J, Wu A. Preparation of preliminary standards for creatine kinase-MB (CK-MB) mass immunoassay. *Clin Chem* 39:1256, 1993 (Abstract 640).
  57. Apple FS, Henry TD, Berger CR, Landt Y. Serum cardiac troponin I, CK-MB and myoglobin in early detection of coronary reperfusion following thrombolytic therapy. *Circulation Suppl* 88:I-151, 1993 (Abstract 801).
  58. Apple FS. Utility of CK-MB and troponin I in acute myocardial infarction and reperfusion. *Clin Biochem Reviews*, Suppl 14:535, 1993. Presented Int Symp Clin Enzymol, Nov. 12, Sydney, Australia.
  59. Apple FS. Serum markers for diagnosis of myocardial infarction: detection of

- reperfusion. Clin Biochem Reviews 14:164, 1993. Presentation XV Int Cong Clin Chem, Nov. 15, Melbourne, Australia.
60. Wu AHB, Valdes R, Apple FS. Cardiac troponin T in serum for detection of minor myocardial injury in patients without myocardial infarction. Annl Clin Lab Sci 24: 458 - 9, 1994. Assoc Clin Scient, May 1994, Charleston, SC.
  61. Preese L, Schlafmann S, Shaw G, Apple F. Quality assurance study of lactate dehydrogenase isoenzyme utilization at a large teaching hospital. Clin Chem 1994; 40: 999 (Abstract 57).
  62. Apple F, Voss E, Lund L, Landt Y. Comparison of cardiac troponin I, CK-MB, and myoglobin for early detection of acute myocardial infarction in patients presenting with chest pain in the emergency department. Clin Chem 1994; 40: 1040 (Abstract 273).
  63. Voss E, Murakami MA, Gernert A, Johnston R, Sharkey S, Apple F. Utility of serum cardiac troponin T and CK-MB for assessing canine myocardial infarct size. Clin Chem 1994; 40: 1040-1 (Abstract 274).
  64. Bodor GS, Porterfield D, Voss E, Smith S, Apple FS. Cardiac troponin I is not expressed in regenerating human skeletal muscle tissue. Clin Chem 1994; 40: 994 ( Abstract 27 ).
  65. Hsieh CC, Serfass RC, Apple FS. Antioxidant enzyme activities in rat skeletal muscles: effects of atrophy, vitamin E and exercise. Med Sci Sport Exerc 1994; 26: S132 (Abstract 743).
  66. McLaurin MD, Henry TD, Apple FS, Sharkey SW. Cardiac troponin I, T and CK-MB in patients with cocaine-related chest pain. Circulating Suppl, 1994; 90: I - 278 ( Abstract 1496 ).
  67. Bodor GS, Porterfield D, Voss E, Kelly J, Smith S, Apple FS. Cardiac troponin T composition in normal and regenerating human skeletal muscle. Clin Chem 1995; 41: S148 ( Abstract 506 ).
  68. Apple F, Dahlmeier B, Sharkey S. Serum cardiac troponin I and T concentrations in end stage renal disease, type I diabetic patients. Clin Chem 1995; 41: S167 ( Abstract 589 ).
  69. Collins R, Tucker J, Apple FS. Early cardiac injury markers in chest pain patients admitted to the emergency department. Clin Chem 1995; 41: S234 ( Abstract 883 ).
  70. Googins MK, Kraft C, Chaney K, Kreyer J, Narlock C, Apple F. Evaluation and implementation of the i-STAT system in the emergency department and newborn intensive care unit. Clin Chem 1995; 41: S187 ( Abstract 677 ).
  71. McLauren MD, Apple FS, Herzog CA, Sharkey SW. Cardiac troponin I, T and CK MB in chronic hemodialysis patients. Circulation Suppl 1995; 92: I-80 ( abstract 0380 ).
  72. Apple FS, Lowe M, Kloss J. Clinical and forensic studies involving thiocyanate and

cocaine. Ther Drug Monitor 1996; 18: 214.

73. Christensen D, Sharkey S, Murakami MA, Mitha N, Apple F. Assessment of left ventricular function by and correlation of serum cardiac troponin I and CK MB following myocardial infarction. Clin Chem 1996; 42: S96 ( abstract 007 ).
74. Voss E, Sharkey S, Hoeft P, Skeate R, Dahlmeier B, Preese L, Apple F. Prognostic value of serum cardiac troponin I and T in chronic dialysis patients: a one year outcome analysis. Clin Chem 1996; 42: S96 (abstract 008).
75. Apple F, Sharkey S, Falahati A, Christensen D, Miller E, McCoy M, Murakami MA. A prospective study implementing cardiac troponin I testing for detection of myocardial infarction. Clin Chem 1996; 42: S96 ( abstract 009 ).
76. Googins MK, Lowe M, Kloss J, Apple F. Serum thiocyanate concentrations in normal and renal impaired patients receiving nitroprusside. Clin Chem 1996; 42: S208 ( abstract 468 ).
77. McLaurin M, Apple FS, Herzog C, Sharkey SW. A comparison of cardiac troponin I and CK MB to rule out myocardial injury in hospitalized patients with renal insufficiency. Circulation Suppl. 1996;
78. King T, Mascotti K, Apple FS. Cardiac troponin I as marker for infarct sizing: correlates to total CK and left ventricular function. Am J Clin Path 1997; 108: 110 ( abstract 37 ).
79. Mascotti KM, Lau B, BurtonE, Apple FS. Clinical evaluation of the Access cardiac troponin I assay for detection of acute myocardial infarction. Clin Chem 1997: 43: S110 ( abstract 18 ).
80. Apple FS, Sharkey SW, Falahati A, Paulson PR, Miller EA. Improved detection of minor ischemic cardiac injury with measurement of serum cardiac troponin I. Clin Chem 1997; 43: S110 (abst 19).
81. Ricchiuti V, Sharkey SW, Murakami MA, Zhang J, Apple FS. Cardiac troponin I and T alterations in hearts with severe left ventricular remodeling and myocardial infarction. Clin Chem 1997; 43: S126 ( abstract 91 ).
82. Voss EM, Ney A, Odland M, Mascotti K, Apple FS. Expression of cardiac troponin T isoforms in skeletal muscle from end-stage renal disease patients. Clin Chem 1997;43: S126 (abstract 92 ).
83. Mascotti K, King T, Apple FS. Cardiac troponin I compared with total creatine kinase as assessment of left ventricular function and infarct size. Am J Clin Path 1997; 108: 343 ( abstract 65 ).
84. Ricchiuti V, Voss EM, Ney A, Odland M, Anderson PAW, Apple FS. Fetal and regenerative troponin T isoforms expressed in renal diseased skeletal muscle are not

- detected by the second generation cardiac troponin T assay by Boehringer Mannheim. Clin Chem 1998; 44: A116 ( abstract 502 ).
85. Koplen B, Wu AHB, Christenson RH, Valdes Jr R, Jortani SA, Johnson NA, Berg A, Apple FS. Clinical evaluation of the Biosite Triage Cardial Panel for the simultaneous measurement of whole blood cTnI, CK MB, and myoglobin for detection of myocardial infarction. Clin Chem 1998; 44: A116 ( abstract 503 ).
  86. Marsh J, Koplen B, Ricchiuti V, Apple FS. Clinical and analytical evaluation of the Abbott AxSYM Troponin I assay used to assist in the diagnosis of myocardial infarction. Clin Chem 1998; 44: A116 ( abstract 504 ).
  87. Miller EA, Apple FS, Collinson P, Anderson FP, Jesse RL, Kontos MC, Levitt MA. Clinical evaluation of the Alpha Dx cardiac panel for total CK mass, CK MB mass, cardiac troponin I, and myoglobin for detection of acute myocardial. Clin Chem 1998; 44: A118 ( abstract 515 ).
  88. Christenson RH, Apple FS, Azzazy HME, Bauer RS, Jacob A, Landt Y, Magneson G, Vaidya H, Wu AHB. Standardization of CK MB mass assays: the use of recombinant CK MB as a reference material. Clin Chem 1998; 44: A119 ( abstract # 517 ).
  89. Cembrowski GS, Apple FS, Ricchiuti V, Velazquez FR, Christenson RH, Johnson ML, Berstein RM, Schwartz SL. Multicenter evaluation of a meter for blood glucose and ketone monitoring. Clin Chem 1999; 45: A28-9 ( abstract 86 ).
  90. Christenson RH, Apple FS, Tan A, Beuerle JR, Koplen B, Ortiz S. Multicenter myoglobin evaluation on the Abbott AxSYM system. Clin Chem 1999; 45: A134-5 ( abstract 477 ).
  91. Ricchiuti V, Apple FS. Expression of cardiac troponin T mRNA in skeletal muscle from patients with end stage renal disease and muscular dystrophy. Clin Chem 1999;45:A144-5 ( abst 513 ).
  92. Wu AHB, Apple FS, Jacobsen D, DiBello PM, Upson BM, Graf EE, Malinow MR. Evaluation of the Abbott Imx assay for homocysteine. Clin Chem 1999; 45: A168-9 ( abstract 601 ).
  93. Chen YJ, Serfass RC, Apple FS. Alterations of cardiac troponin T in myocardium and serum following acute prolonged intense swimming in trained and untrained rats. Med Sci Sports Exerc 1999; 31: S51 ( abstarct 66 ).
  94. Apple FS, Murakami MA, Davis G, Quist H, Dahlmeier B, Herzog C. Prognostic value of cardiac troponin testing in end stage renal disease. Clin Chem 2000; 46: A27 (abstract 106).

95. Fantz CR, Powell C, Karon B, Dayal M, Sadovsky Y, Johan V, Apple FS, Gronowski AM. Assessing the diagnostic efficiency of TDx-FLM II to predict fetal lung maturity. Clin Chem 2000; 46: A63 (abstract 237).
96. Apple FS, Murakami MA, Panteghini M, Christenson R, Dati F, Mair J, Wu A. international survey of cardiac troponin users. Clin Chem 2000; 46:A76 (abstract 286).
97. Apple FS, Koplen B, Murakami MA. Clinical and analytical evaluation of the Vitros immunodiagnosics products troponin I assay for detection of myocardial infarction. Clin Chem 2000; 46: A83 (abstract 315).
98. Kahn S, Apple FS, Bodor G, Panteghini M, Welsh M, Wu A, Bunk D, Christenson R. Standardization of cardiac troponin I assays: pilot evaluation of ten candidate reference materials. Clin Chem 2000; 46: A89 (abstract 340).
99. Ricchiuti V, Apple FS. Regulation of muscle gene and protein expression of creatine kinase B in chronic renal disease. Clin Chem 2000; 46: A90 (abstract 345).
100. Burt M, Anderson D, Apple FS. Implementation of free phenytoin therapeutic drug monitoring. Am J Clin Path 2000; 114: 301 (abstract 9).
101. Herzog CA, Murakami MM, Davis GK, Quist H, Dahlmeier B, Collins A, Apple FS. Prognostic value of cardiac troponin testing in end stage renal disease. J Am Soc Nephrol 2000; 11: SA634.
102. Davis GK, Labugger R, Van Eyk JE, Apple FS. Diseased renal tissue does not express cardiac troponin T. Clin Chem 2001; 47: A202 ( abstract 662).
103. Murakami MM, Davis GK, Quist HE, Dahlmeier BA, Herzog CA, Collins AJ, Apple FS. Prognostic value of cardiac troponin testing in end stage renal disease. Clin Chem 2001; 47: A203 (abstract 664).
104. Uettwiller-Geiger D, Wu AHB, Apple FS, Venge P, Jevans AW, Darte C, Roberts S, Yu Y, Olson M. Analytical performance of Beckman Coulter's Access AccuTnI (troponin I) in a multicenter evaluation. Clin Chem 2001; 47: A204 ( abstract 670).
105. Jevans AW, Apple FS, Wu AHB, Venge P, Uettwiller-Geiger D, Darte C, Olson M. Southwick PC. Clinical performance of Beckman Coulter's Access AccuTnI (troponin I) in a multicenter clinical trial. Clin Chem 2001; 47: A205 ( abstract 671).
106. Murakami MM, Wieczorek S, Quist HE, Mathews WE, Bailly K, Sullivan SS, Peterson JJ, Wu AHB, Apple FS. Preliminary findings for use of Ortho-Clinical Diagnostics Vitros troponin I assay for risk stratification in acute coronary syndrome patients. Clin Chem 2001; 47: A211 (abstract 693).
107. Johari V, Davis GK, Hoybook K, Weber-Shrikant E, Murakami MM, Apple FS. Retrospective database review for use of cardiac troponin I for detection of myocardial infarction. Clin Chem 2001; 47: A212 ( abstract 698).

108. Apple FS, Murakami MM, Jesse RL, Levitt MA, Collinson PO. Risk stratification of patients with acute coronary syndromes utilizing the First Medical Alpha Dx Point of Need cardiac marker system. Clin Chem 2002; 48 (suppl) A96.
109. Murakami MM, Chmielewski LR, Sykora RT, Bardales R, Apple FS. International survey of cardiac troponin users. Clin Chem 2002; 48 (suppl) A98.
110. Murakami MM, Quist HE, Mathews WE, Otto AP, Apple FS. Release characteristics of ischemia modified albumin as measured by the albumin cobalt binding test following a marathon race. Clin Chem 2002; 48 (suppl) A97.
111. Knudsen LL, Ravkilde J, Apple FS, Kristensen SD, Thesen L, Nielson TT. Biochemical markers of myocardial injury in patients with stable angina pectoris undergoing successful PTCA: clinical importance. Clin Chem 2002; 48 (suppl) A100.
112. Murakami MM, Berndt LL, Quist HE, Otto AP, Mathews WE, Doyle PJ, Apple FS. Reference limit determinations for cardiac troponin I and T and CKMB mass. Circulation Suppl II 2002; 106: II-531 (abstract 2620).
113. Lakshminarayan K, Anderson DC, DuPlessis-Tehida ML, Murakami MM, Apple FS. Association between cardiac troponin I concentrations and discharge outcomes in patients with acute ischemic stroke. Neurology 2002; 58 Suppl 3: A120-1 (abstract P0.054)
114. Davis GK, Murakami MM, Apple FS. Predictive value of perioperative and postoperative cardiac troponin I for adverse outcome following coronary artery bypass surgery. Clin Chem 2003: 49 suppl; A36.
115. Murakami MM, Doyle PJ, Quist HE, Otto AP, Pearce LA, Herzog CA, Apple FS. Risk assessment in end stage renal disease patients using cardiac troponin T and I, proBNP, and hs CRP measurements. Clin Chem 2003: 49 suppl; A66.
116. Apple FS, Doyle PJ, Quist HE, Otto AP, Murakami MM. Cardiac troponin measurements for risk stratification in acute coronary syndrome patients using 99<sup>th</sup> percentile limits for eight assays. Clin Chem 2003: 49 suppl; A61.
117. Lin JC, Apple FS, Murakami MM, Luepker RV. Rates of diagnosis of acute myocardial infarction utilizing cardiac troponin I or CK MB. Clin Chem 2003: 49 suppl; A62.
118. Quist HE, Otto AP, Doyle PJ, Murakami MM, Apple FS. Analytical and clinical comparison of the Ortho Clinical Diagnostics Vitros and Beckman Access cardiac troponin I assays. Clin Chem 2003: 49 suppl; A62.
119. Panteghini M, Pagani F, Yeo KT, Apple FS, Christenson RH, Dati F, Mair J, Ravkilde J, Wu AHB. Evaluation of the imprecision at low range concentrations of the assays for cardiac troponin determination. Clin Chem 2003; 49 (S6): A34-5.